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Research Productivity of University of Petroleum and Energy Studies during 2004-2018 : A Scientometric Analysis

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ABSTRACT:

The present study is a qualitative and quantitative analysis of scholarly research publications for mapping the research productivity of University of Petroleum and Energy Studies, over a 15 year period (2004-2018). This study is based on SCOPUS database, and a total of 1319 publications were retrieved in order to examine the growth of publication, access type, type of documents of publication, authorship pattern, international collaboration, highly productive subject, author and their citation count etc. We have noticed an increasing trend in the number of publication throughout the year of our study.

Keywords: Scientometrics, Citation analysis, Research output, SCOPUS, UPES

INTRODUCTION:

University of Petroleum and Energy Studies, Dehradun is a renowned University in Northern part of the India, in the state of Uttarakhand. It is a UGC recognized state private university established by an Act of the State Legislature of Government of Uttarakhand in the year 2003 and it is listed under Section 2(f) of UGC Act. It is the first Indian University which has got QS 3 star rating overall, QS 5 star rating on the parameters of employability and facilities and a 4 star rating in teaching, in the year 2016.

Faculty of any institution is of paramount importance for meaningful impact on the present and future growth of the students as well as on the country. UPES has over five hundred national and international faculty members from highly renowned and leading academic institutes. According to National Institutional Ranking Framework (NIRF), scholarly publication of university faculty members is treated as one of the parameters of University ranking. The present study is the scientometric analysis of scholarly research output of the faculty members of the university.

LITERATURE REVIEW:

Several studies have been conducted by various researchers to evaluate the research output of a University. For doing this work authors have reviewed and understood scientometric studies on various university researches.

Hugar, (2019) has done a bibliometric analysis of scientific publications of Goa University during 2008-2017 using web of science database. In this study authors have found those maximum articles which were published in recent past years. He also found that highly productive subject is chemistry with 26% of total publication.

Maurya, Shukla, and Ngurtinkhuma (2018) investigated the scholarly communication of Mizoram University which are listed in Web of Science. A total number of 404 scholarly articles have been retrieved during 2007 to 2016. The year 2016 gets the highest citation and the author Thapa RK has the highest contributors. There are 27 countries with which research collaboration has been established.

Bharti and Bossart, (2016) have carried out a bibliometric analysis of chemical engineering publications at the University of Florida through web of science database during 2011-2015. They found 279 articles published in their five years study period. Of those articles 27 percent article are shared by five journals, with an average journal impact factor of 3.459.

Gautam & Mishra, (2015) have conducted a Scientometric Study Based on Indian Citation Index during 2004-2013 of Banaras Hindu University. The results show that research output of Banaras Hindu University is increasing year by year with an average rate of 104.1 publications per year. Maximum authors have been contributed by joint authors, 404 (39 %) articles were published in Science citation indexed journals and 637 (61 %) articles were published in non-Science citation indexed journals.

OBJECTIVES OF THE STUDY:

The objective of this study is to identify the research output and publication trends of University of Petroleum and Energy Studies that were visible in SCOPUS during the period of 2004-2018. The other important focus areas are listed below:

- Evaluate the impact of research by the faculty members of UPES
- Find out the area of research of UPES
- To find out the productive contributor and subject of the UPES fraternity.
- Identify the national and international collaboration in the field of science and technology.

METHODOLOGY:

To conduct this research, data has been downloaded on 6th February 2019 from the SCOPUS database for a period of 15 years (2004-2018). The keywords which were used for extracting data are *'University of Petroleum and Energy Studies'* in the *'Affiliations Field'* of SCOPUS search bar. Total 1319 records were downloaded. The study is limited to a certain period of time, the reason of the limitation is to analyze the data according to objective. We have found research articles published in journals, book chapter and conference proceedings etc.

DATA ANALYSIS AND INTERPRETATION:

In this area, the main focus to calculate the results and analyze the objectives of our study. The discussion has been done step wise in different parameter.

a. Growth of Publications:

Table 1 describes the Annual Growth rate (AGR), No. of publication in % and the year wise distribution of the publication of the total number of documents for period 2004 to 2018. AGR value has been calculated by the following formula.

$$AGR = \frac{\text{End Value - First Value}}{\text{First Value}} \times 100$$

It has been observed that total no. of publication of UPES is 1319. The time period of 2004-2018, 2005 and 2010 have higher AGR, but maximum paper has been published in the year of 2018 which is 28.05 % of the total 15th years growth span. So we can conclude by saying that there is an increasing tendency in the publication over the time period.

Table 1

Year	No. of Publications	No of Publication (100%)	Annual Growth Rate(AGR)
2004	1	0.075	
2005	6	0.454	500
2006	7	0.530	16.66
2007	7	0.530	0
2008	5	0.379	-28.57
2009	2	0.151	-60
2010	12	0.909	500
2011	24	1.819	100
2012	59	4.473	145.8

2013	77	5.837	30.50
2014	107	8.112	38.96
2015	188	14.25	75.70
2016	188	14.25	0
2017	260	19.71	38.29
2018	376	28.50	44.61
Total	1319	100	

b. Open Access vs Close Access

In Table 2 access type of publications has been discussed and categorized two types, i.e. open access and others. Out of 1319 articles, 114 articles were published in open access journal and rest of the articles was published in other journals. Although the present era is an open access era, but this table shows that there is less tendency of publication of open access among university faculty.

Table 2		
Open Access	114	8.64 %
Other	1205	91.35 %
Total	**1319**	100.00 %

c. Document Type of Publications

The Table 3 reflects that the tendency of most of the publications of UPES are covered by SCOPUS databases is Journal Article papers, which is 659 publications (49.96%) followed by Conference paper with 505 publications (38.28%). Review and Book chapter got third and fourth position respectively 55(4.16%) & 51(3.86%) publications. Rest of the publications are below 1% as shown in the table. Result shows that the trends of research are mostly published in the form of Journal Article.

Table 3		
Document Type	No. of Document	Percentage (in 100%)
Article	659	49.96
Conference Paper	505	38.28
Review	55	4.169
Book Chapter	51	3.866
Article in Press	25	1.895
Editorial	7	0.530
Business	6	0.454

Article		
Book	5	0.379
Erratum	2	0.151
Letter	2	0.151
Note	2	0.151
Total	**1319**	**100.00**

d. Year Wise Authorship Pattern

Table 4 describes that year-wise authorship pattern and it shows that out of 1319 publications in the period covered by the study, 96 articles have been published by single author, 264 by two authors, 387 articles by three authors and 572 articles are multi-authored (*more than 3 authors).* It is observed from table 4 that multi authored publication are more productive than others.

Table 4

Year	Single Author	Two Author	Three Author	Multi Author	Total
2004			1		1
2005	3	2		1	6
2006	1	2	2	2	7
2007		3	4		7
2008	1	2	1	1	5
2009		1	1		2
2010	4	3	1	4	12
2011		6	12	6	24
2012	6	19	13	21	59
2013	6	27	22	22	77
2014	21	21	24	41	107
2015	10	32	57	89	188
2016	15	26	69	78	188
2017	11	38	82	129	260
2018	18	82	98	178	376
Total	**96**	**264**	**387**	**572**	**1319**

e. Collaboration with No of Citations

Table 5 shows collaborative work of authors and their citation count. From the table below, it is clearly observed that multi authors have maximum publication with maximum citation count followed by three authors, two authors and single author. So we can claim that collaborative work is more fruitful than single author publication.

Table 5		
	No. of Articles	**No. of Citations**
Single	96	173
Two	264	591
Three	387	1308
Multi	572	2309
Total	**1319**	**4381**

f. Top Journals with no. of Publications & Citations

Table 6 describes the top 5 journals with number of article published throughout the whole study year. And it is observed that the journal of *"Advances in Intelligent Systems and Computing*" is the top journal in the computer science discipline according to number of Article published.

Table 6		
Journal	**Subject**	**No. of Articles**
Advances in Intelligent Systems and Computing	Computer Science	137
International Journal of Applied Engineering Research	Engineering	25
Communications in Computer and Information Science	Computer Science	21
Biofuels	Petroleum	20
Renewable and Sustainable Energy Reviews	Energy	14

Table 7 describes the top 5 journals with of no. of citation received. It is identified that the journal of "*Renewable and Sustainable Energy Reviews"* has maximum number of citations but "*Progress in Polymer Science*" received maximum in term of Citation per article.

Table 7			
Journal	**No. of Article**	**No. of Citation**	**Citation per Article**
Renewable and Sustainable Energy Reviews	14	559	39.92857143
Bioresource Technology	8	298	37.25
Progress in Polymer Science	1	87	87
Advanced Functional Materials	1	50	50
Dalton Transactions	1	50	50

g. International Collaboration

The ability of a university to attract undergraduates, postgraduates and faculty from all over the planet is key to its success on the world stage ("World University Rankings 2018 methodology | THE Rankings," n.d.). Table 9 describes the international collaboration of the university. And we observed that total 211 publications are with foreign collaboration within the research study period. It is visible that UPES have maximum collaboration with United States with 51 (24.17%) publication followed by 19 (9.00 %) publications with South Korea, 13(6.16%) publications with United Arab Emirates and so on.

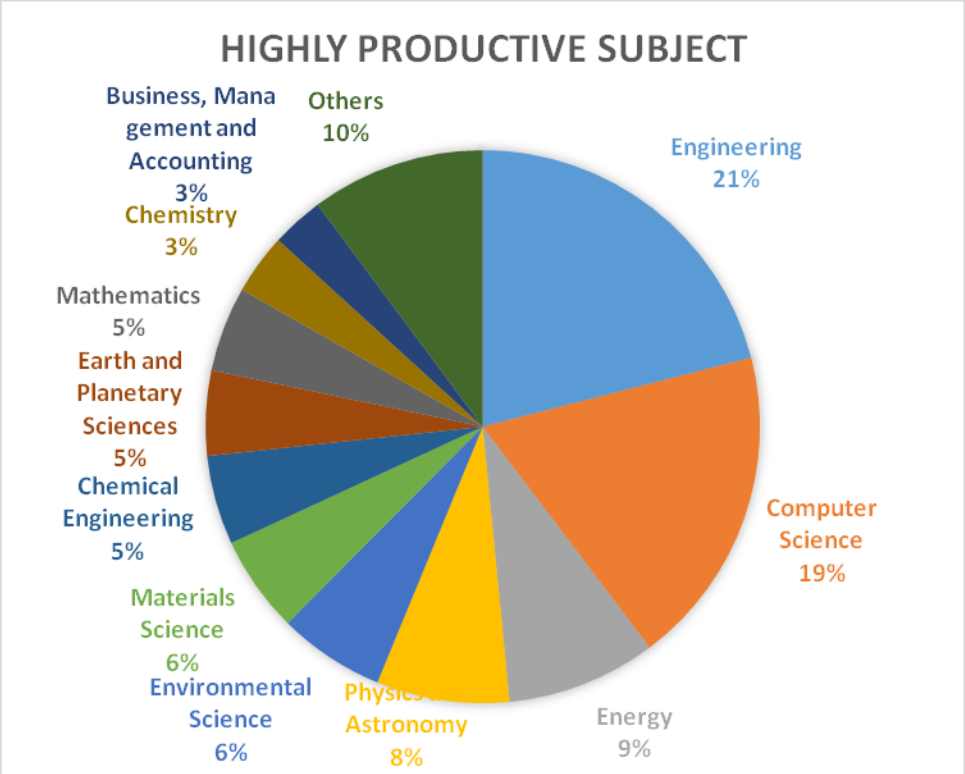
Table 9

Country	No. of Publication	Percentage	Country	No. of Publication	Percentage
United States	51	24.17	Oman	3	1.421
South Korea	19	9.00	Peru	3	1.421
United Arab Emirates	13	6.161	Portugal	3	1.421
Canada	12	5.687	Taiwan	3	1.421
Germany	12	5.687	China	2	0.947
United Kingdom	9	4.265	Cuba	2	0.947
Ethiopia	6	2.843	Italy	2	0.947
Saudi Arabia	6	2.843	Netherlands	2	0.947
Austria	5	2.369	Singapore	2	0.947
Malaysia	5	2.369	Sweden	2	0.947
South Africa	5	2.369	Turkey	2	0.947
Japan	4	1.895	Estonia	1	0.473
Australia	3	1.421	Israel	1	0.473
Brazil	3	1.421	Kenya	1	0.473
France	3	1.421	Norway	1	0.473
Ireland	3	1.421	Spain	1	0.473
Kuwait	3	1.421	Sri Lanka	1	0.473
Mexico	3	1.421	Switzerland	1	0.473
Moldova	3	1.421	Thailand	1	0.473
New Zealand	3	1.421	Undefined	6	2.843
Total 211 Article were published with foreign collaboration					

h. Highly productive subject

To examine the research trend in order to gauge the research output, the total publication were divided into broad subject category. It is observed that maximum publication were in engineering discipline which is 21% of the total publication. Computer Science received 2nd position in order

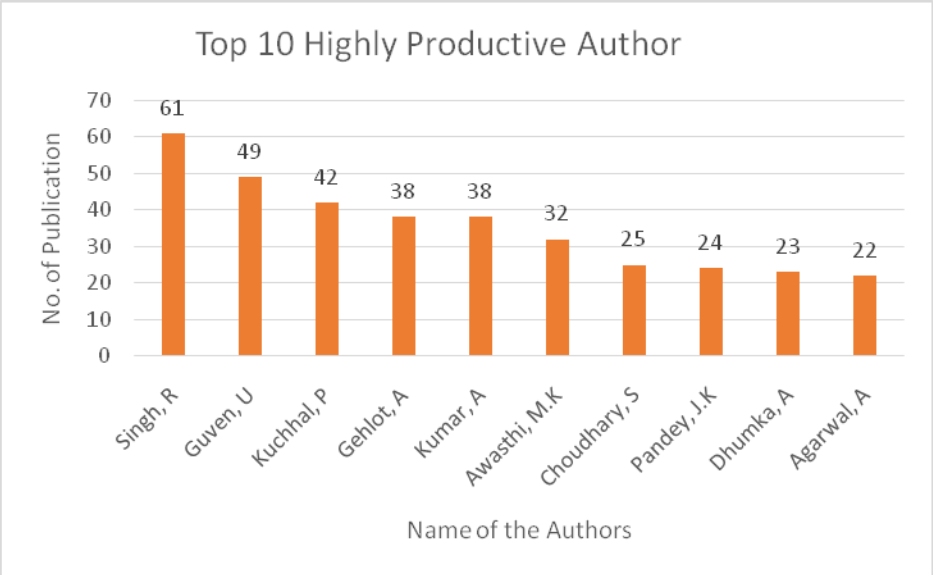
to number of publication, followed by Energy, Physics and Astronomy, Environmental Science, material Science and so on.



i. Highly Productive Author

Table 10		
Author	**Discipline**	**No. of Publication**
Singh, R	Electrical/Electronics Engineering	61
Guven, U	Aerospace	49
Kuchhal, P	Physics	42
Gehlot, A	Electrical/ Electronics Engineering	38
Kumar, A	Electrical/Electronics Engineering	38
Awasthi, M.K	Mathematics	32
Choudhary, S	Computer Science	25
Pandey, J.K	R & D	24
Dhumka, A	Computer Science	23
Agarwal, A	Computer Science	22

Table 10 shows the top ten highly productive authors and their discipline. It is shown from the above and below table that R. Singh from the Electrical department has the highest number of publications which is 61 followed by U. Guven from Aerospace department, P. Kuchhal from the Physics department and so on.



DISCUSSIONS AND CONCLUSION:

The University of Petroleum and Energy studies is one of the globally renowned Universities. The objective of this study is to get an overview of scholarly research publication of the University.The best thing of UPES is the consistency in publication which is increased year by year. Faculty members from the UPES have the tendency to publish articles from various renowned journals and a well bonded collaboration with the foreign universities. The study observed the UPES have maximum collaboration with United States with 51 (24.17%) publication followed by South Korea 19 (9.00 %), United Arab Emirates 13(6.16%) and so on. The area of Engineering, Computer Science, Energy, Physics & Astronomy have become the top areas of scholarly communication. The prolific contributors of the various departments are R. Singh from the Electrical department, has the highest number of publication followed by U. Guven from Aerospace department, P. Kuchhal from the Physics department.

The articles also have remarkable citations, the number of citations and its growth rate also increased over the period. But the main lacuna of the faculty members is they have published in closed access journals. Open Access journal articles have more visibility and possibility to get citation. So, our opinion is that they should focus on Open access publication for better visibility and to the betterment of the end users as well as the readers.

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